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AN EVALUATION OF THE HIGH-PROBABILITY INSTRUCTION SEQUENCE WITH AND WITHOUT PROGRAMMED REINFORCEMENT FOR COMPLIANCE WITH HIGH-PROBABILITY INSTRUCTIONS

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We assessed the effects of reinforcement and no reinforcement for compliance to high-probability (high-*p*) instructions on compliance to low-probability (low-*p*) instructions using a reversal design. For both participants, compliance with the low-*p* instruction increased only when compliance with high-*p* instructions was followed by reinforcement. These results suggest that providing reinforcement for high-*p* instructions may result in increased compliance to low-*p* instructions.

DESCRIPTORS: behavioral momentum, compliance, high-probability instruction sequence, motivating operations

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As an intervention to increase compliance, the high-probability (high-*p*) instruction sequence involves the delivery of several instructions that result in compliance immediately prior to the delivery of an instruction that does not typically result in compliance (termed a low-probability [low-*p*] instruction). In their seminal study, Mace et al. (1988) reported that compliance with low-*p* instructions increased when low-*p* instructions were preceded by a high-*p* instruction sequence. However, some subsequent reports suggest that effects of the high-*p* sequence are inconsistent (e.g., Rortvedt & Miltenberger, 1994; Zarcone, Iwata, Mazaleski, & Smith, 1994). Typically, two antecedent manipulations are made during the high-*p* instruction sequence: The high-*p* instruction sequence is introduced, and some form of potential reinforcement (e.g., praise) is delivered for compliance with the high-*p* instructions.

It is possible that reported treatment failures are attributable to the consequences for high-*p* compliance not functioning as reinforcement in some cases. In most reports, praise is the only programmed consequence for compliance with the high-*p* instructions, and it is unclear if praise functioned as reinforcement in those investigations. For example, Mace, Mauro, Boyajian, and Eckert (1997) reported that for some participants using praise alone as a consequence for compliance with high-*p* instructions did not lead to increased compliance with low-*p* instructions, whereas praise combined with tangible reinforcers did. Moreover, although Mace et al. (1988) reported that the antecedent delivery of response-independent stimuli (praise) did not increase compliance, others have reported findings to the contrary, further suggesting that contact with reinforcement prior to a low-*p* instruction might be an important variable (e.g., Bullock & Normand, 2006; Ducharme & Rushford, 2001; Kennedy, Itkonen, & Lindquist, 1995). Of the published research, only Bullock and Normand conducted a formal preference assessment to identify the consequences used for compliance with the high- and low-*p* instructions. Therefore, it is unclear if the consequences provided for compliance with high-*p* instructions functioned as reinforcement in other studies involving the high-*p* instruction sequence, or if reinforcement for such compliance is necessary to increase subsequent compliance with low-*p* instructions.

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The present study directly assessed the role of reinforcement for compliance with high-*p* instructions by comparing compliance levels when programmed reinforcement followed every instance of compliance with a high-*p* instruction to compliance levels when no programmed reinforcement was delivered for compliance with high-*p* instructions. In addition, a formal preference assessment was conducted to identify the preferred items used as consequences during the high-*p* instruction sequence.

METHOD

Participants and Setting

Two young children with developmental disabilities and a history of noncompliance participated. Jonathan was a 4-year-old boy who had been diagnosed with a developmental delay and language impairment and who received 60 min of speech therapy per week at the time of the study. All sessions were conducted in the living room of his home, which contained a TV/DVD player, a small table, and a couch. Peter was a 5-year-old boy with language delays but no formal diagnosis who was not attending school at the time of the study. All sessions were conducted in his bedroom, which contained a bed, two shelves, and a small plastic table.

Response Definitions and Measurement

We identified potential high- and low-*p* instructions based on caregiver interviews during which we compiled a list of reported high- and low-*p* instructions and corresponding responses. Each instruction from the list was presented to each participant 10 times during each session. Each delivery of an instruction and the resulting opportunity to comply was considered a trial. The total number of trials on which the participant complied with each instruction was recorded. Instructions resulting in compliance on less than 30% of the trials were used as low-*p* instructions. Instructions resulting in compliance for at least 80% of the trials were used as high-*p* instructions. Low-*p* instructions for Jonathan were, "Give me [toy]," and "Put your shoes on." Jonathan was allowed 10 s following task initiation to put his entire foot into each shoe. The low-*p* instruction for Peter was "Clean up the toys." Peter was allowed 2 min following task initiation to place all toys into a toy box. High-*p* instructions for both participants involved simple requests such as "Clap," "Touch your nose," "What's your name?" and "What color is this?"

During all experimental sessions, the experimenter recorded an instance of compliance if the participant initiated the response specified by the instruction within 10 s and completed it within the time frames described above, otherwise an instance of noncompliance was scored. Percentage compliance with the low-*p* instruction was calculated by dividing the number of instances of compliance by the number of instructions and converting this ratio to a percentage.

Procedure

A reversal design was arranged for both participants (ABACABAC for Jonathan for "Put your shoes on," ACABACAB for Jonathan for "Give me [toy]," ACABABAC for Peter). A was the baseline of low-*p* instructions only, B was high-*p* plus no reinforcement, and C was high-*p* plus reinforcement. The two low-*p* instructions for Jonathan were evaluated concurrently. That is, trials for both instructions were conducted during each visit. For both participants, each experimental session consisted of five trials with the exception of the first baseline session, which consisted of 10 trials carried out during the initial assessment of low-*p* instructions. All sessions were trial based and typically lasted 15 min. Participants were visited approximately once per week with multiple sessions conducted during each 2-hr visit. The experimenter used an electronic timer to facilitate the delivery of instructions during

experimental sessions. Although the timer alarm was audible to participants, it did not appear to affect their responding in any way.

Stimulus preference assessment. A paired-stimulus preference assessment (Fisher et al., 1992) was conducted to identify preferred items for use during sessions. Thereafter, a brief multiple-stimulus-without-replacement assessment (Carr, Nicolson, & Higbee, 2000) was conducted weekly using the items identified as highly preferred in the paired-stimulus preference assessment. Participants were given a choice between the two most highly preferred items immediately before the start of each session. Only edible items were used, because they could be delivered easily and quickly during sessions, and the likelihood of problem behavior resulting from the removal of a preferred item or termination of a preferred activity was minimized. Candy and potato chips were used with Jonathan, and gummy worms and juice were used with Peter.

Baseline. The experimenter remained within 1.5 m of the participant. A timer sounded every 60 s, prompting the experimenter to establish eye contact with the participant and to issue a low-*p* instruction. If the participant complied with the instruction, the most preferred edible item was delivered along with descriptive praise. If the child was noncompliant, no programmed consequences were delivered, and the trial ended.

*High-*p *instruction sequence.* The experimenter remained within 1.5 m of the participant. Three high-*p* instructions were delivered according to a fixed-time 10-s schedule with a timer sounding every 10 s, prompting the experimenter to issue an instruction. Following each instance of compliance to a high-*p* instruction, the second most preferred edible item was delivered with descriptive praise. Approximately 10 s following the final high-*p* instruction in the sequence, a low-*p* instruction was delivered. Compliance to the low-*p* instruction produced the delivery of the most preferred edible item and praise. If the participant failed to comply with one of the high-*p* instructions, the instructional sequence ended, and no data were scored. A new sequence of high-*p* instructions was presented until compliance occurred with three consecutive instructions. Each instructional sequence was separated by at least 2 min to avoid the arrangement of a high-demand situation via the repeated presentation of successive demands.

*High-*p *instructions without programmed reinforcement.* This condition was identical to the high-*p* instruction sequence condition except that no preferred items or praise was delivered following compliance to high-*p* instructions. Compliance with low-*p* instructions resulted in the delivery of the most preferred edible item and descriptive praise.

Interobserver Agreement

For 51% of the sessions for Jonathan and 48% of the sessions for Peter, a second observer recorded in real time whether the participant complied with the experimenter's instruction. Interobserver agreement for trials with compliance with low-*p* instructions was calculated by dividing the number of trials with agreement (both observers scored that the participant complied with the low-*p* instruction) by the total number of trials and converting this ratio to a percentage. Interobserver agreement for Jonathan was 100% for baseline, 100% for high-*p* instructions without programmed reinforcement, and 94% for high-*p* instructions with programmed reinforcement (range, 80% to 100%). For Peter, agreement was 100% across all conditions.

RESULTS AND DISCUSSION

Jonathan complied with the instruction "Put your shoes on" (Figure 1, top) on 9% of trials during baseline, 10% during high-*p* instructions without programmed reinforcement, and 61% during high-*p* instructions with programmed reinforcement. He complied with the instruc-

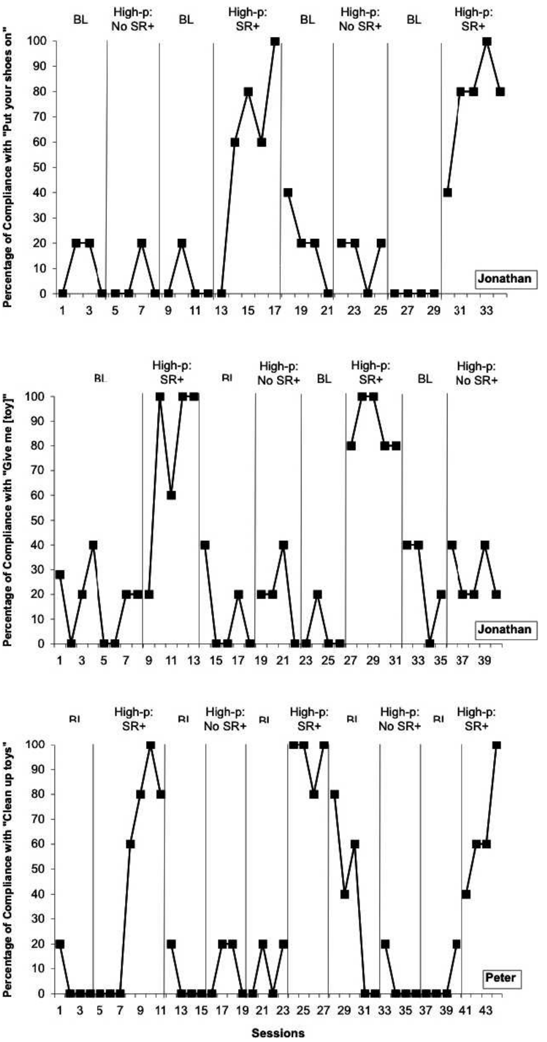

Figure 1. Percentage of compliance observed in baseline (BL), high-*p* instruction sequence with programmed reinforcement (high-*p*: SR+), and high-*p* instruction sequence without programmed reinforcement (high-*p*: no SR+) across two target behaviors for Jonathan and one target behavior for Peter.

tion, "Give me [toy]" (Figure 1, middle) on 15% of trials during baseline, 24% during high-*p* instructions without programmed reinforcement, and 76% during high-*p* instructions with programmed reinforcement. Jonathan complied with 100% of the high-*p* instructions across conditions for both instructions. Peter complied with the instruction "Clean up the toys" (Figure 1, bottom) on 13% of trials during baseline, 7% during high-*p* instructions without programmed reinforcement, and 64% during high-*p* instructions with programmed reinforcement. Peter failed to comply with two high-*p* instructions during the high-*p* instructions with programmed reinforcement and with five high-*p* instructions during the high-*p* instructions without programmed reinforcement.

For both participants, compliance increased only when reinforcement was arranged for compliance with high-*p* instructions. In practical terms, this suggests that programmed reinforcement for compliance with high-*p* instructions should be arranged when using the high-*p* instruction sequence and that steps should be taken to formally identify preferred items or reinforcers prior to implementation of the high-*p* procedure. Additional evidence to this effect is provided by Mace et al. (1997), who reported that for some participants, arranging the high-*p* sequence such that compliance produced only social praise was not effective, whereas the addition of tangible reinforcers was. It is possible that for those participants, praise was not a reinforcer in the experimental context, whereas the tangible items were. However, a more thorough component analysis, in which the antecedent delivery of preferred stimuli is compared to the antecedent delivery of high-*p* instructions with and without programmed reinforcers, seems warranted. When considered in the context of the results reported by Bullock and Normand (2006), Ducharme and Rushford (2001), and Kennedy et al. (1995), these results suggest that the increased availability of preferred stimuli antecedent to the issuance of low-*p* instructions might be an important variable underlying the effects reported with the high-*p* instruction sequence.

In the current study, a 10-s interinstruction interval was used so that the participants would have sufficient time to consume the edible items provided and because some researchers have reported 10 s to be a typical latency to

compliance for children (Shriver & Allen, 1997). Further evaluation of the effects of differing interinstruction intervals is warranted, because the use of shorter intervals might result in increased low-*p* compliance following the delivery of high-*p* instructions without programmed reinforcers by increasing the rapidity of compliance during the high-*p* sequence (Nevin, 1996). Future researchers should investigate this possibility by manipulating the length of interinstruction intervals systematically.

A limitation of the current study is that no functional analysis was conducted prior to the experimental manipulations, making it impossible to determine if noncompliant behavior (i.e., behavior that interfered with compliance such as moving away from the task or experimenter) continued to contact reinforcement during the high-*p* instruction conditions. The effects of the high-*p* instruction sequence are at least sometimes dependent on inappropriate behavior being placed on extinction, with the continued availability of reinforcement (e.g., escape) for noncompliance even resulting in decreased compliance with both high- and low-*p* instructions under certain conditions (Zarcone et al., 1994). In the current study, there were no experimenter-manipulated consequences for any behavior other than compliance, so it is unclear if noncompliant behavior was placed on extinction. Future researchers should incorporate functional analyses of noncompliant behavior to identify the maintaining variables for noncompliance and explore the role of extinction with respect to the effects of the high-*p* instruction sequence with and without programmed reinforcers.

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